# CHOICE OF INTRAVENOUS INDUCTION AGENTS AND INTUBATION NEUROMUSCULAR BLOCKERS BY ANESTHESIA PROVIDERS

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STANEK

# CHOICE OF INTRAVENOUS AGENTS AND INTUBATION NEUROMUSCULAR BLOCKERS BY ANESTHESIA PROVIDERS

Master Thesis

By

Maria Stanek

Uniformed Services University of the Health Sciences

Graduate School of Nursing

APPROVED:

E. Jane McCarthy, Capt., PHS, CRNA, Ph.D., FAAN, Committee Chair

Eugene Levine, B.B.A., M.P.A., PhD., Member

Regina Aune, Lieutenant Colonel, USAF, PhD., Member

Maura McAuliff, Lieutenant Colonel, USAF, CRNA, PhD., Consultant

Faye G. Abdellah, Ed.D., Sc.D., RN, FAAN
Dean and Professor
Graduate School of Nursing

10/10/96

Department of Defense

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Abstract: Currently, a variety of agents are available to anesthesia providers for induction and intubation for general anesthesia. This variety provides a flexibility to the provider that has not been previously studied. One aim of this study was to show which intravenous induction and neuromuscular blockers for general anesthesia and intubation are currently being used among a sample of military providers. The agents identified for induction were propofol, thiopental, and fentanyl. The agents identified for neuromuscular intubation blockers were succinylcholine, mivacron, vecuronium, atracurium, arduan, pavulon, and zemuron. It was also an aim of this study to determine if experience of the provider made a difference in the agent chosen. Both quantitative and qualitative methods were employed in a descriptive research design. Quantitative data were collected from a retrospective chart review of cases in which anesthesia was provided. The qualitative data were collected by personal interviews with each anesthesia provider, using case scenarios developed by the researcher. A comparison of quantitative and qualitative data of induction and intubation agents collected from CRNAs and MDAs according to experience of both types of providers was analyzed to provide meaningful data. The difference in choice of agents by experience was found not to be significant.

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THESIS

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# CHAPTER 1

# THE PROBLEM

## Background

There is a large amount of information available to anesthesia providers on intravenous induction anesthetics and neuromuscular intubation agents. Anesthesia providers also draw upon their prior experiences and training to assist them in choosing these agents. Due to the availability of new agents for induction and intubation, anesthesia providers have a wider choice than previously (White & Smith, 1993). The newer neuromuscular blocking agents have shorter time of onset and fewer cardiovascular side effects (Lien, Belmont, Kopman, and Savarese, 1993).

One goal of the anesthesia provider is to provide optimal conditions for laryngoscopy and intubation by decreasing sympathetic response while maintaining a stable hemodynamic state (Vercellino, 1992). An anesthesia provider considers potency, side effects, onset, and duration of action, as well as patient variables (age, gender, physical status, current medical treatment, and surgical procedure) when deciding which agents to use (Vercellino, 1992).

The experience of the anesthesia provider may make a difference in which agents they choose. Finally, the choice of agent is based on the anesthesia provider's goals pertaining to the management of medical and surgical needs of the patient (Vercellino, 1992).

In this time of changing health care economics (Orkin, 1993), the anesthesia provider considers the use of drugs with the same efficacy but less cost. Anesthesia providers need to apply cost-benefit analysis to each patient when possible (Tuman & Ivankovich, 1993). In the cost containment environment of health care today, clinical and budgetary decisions are considered when choosing agents for anesthesia (Suver, Arikian, Shannon, Doyle, & Sweeney, 1995). With the increasing costs of health care and military rightsizing, knowing what military anesthesia providers want to use in their daily practice may affect which agents will be available at military institutions in the near future because of new budget restraints.

## Rationale

The use of intravenous anesthetic technique for induction of anesthesia has resulted in a smoother emergence as compared with the more traditional inhalational induction techniques (White & Smith, 1993.) The availability of several new neuromuscular blocking agents with fewer adverse side effects and different pharmacodynamics has increased the flexibility of anesthesia providers practice (Lien, et al. 1993). Knowing anesthesia providers' preference of agents, why they choose them, and if experience makes a difference in their choice is significant because it can serve as a reference to other anesthesia providers and a guide for student registered nurse anesthetists (SRNAs). The reasoning used by anesthesia providers for the use of these agents qualified why these agents are used in their practices. This study documents anesthesia providers' choice of intravenous induction agents and

neuromuscular intubation blocking agents for two patient scenarios and the agents used in their practice. This study also determined if the experience level of the provider made a difference in the agents chosen.

Several intravenous induction agents and neuromuscular blocking agents are available to anesthesia providers. An overview of two intravenous induction agents and three intravenous neuromuscular blocking agents is provided with the focus on adult patients.

## Induction Agents

Thiopental is a thiobarbiturate and its properties are summarized in Table 1. Thiopental has an onset time of 10-20 seconds reflecting brain uptake with rapid onset of central nervous system depression. An ultra short duration of action of 5-15 minutes for awakening reflects the rapid redistribution from the central nervous system to muscle and adipose tissue because of the agent's high lipid solubility. The induction dose is 3-5 mg/kg intravenously with a reduced dose for the elderly. Thiopental induces hypnosis, anesthesia, some anterograde amnesia, acts as antianalgesic, and has a cumulative effect with repeated doses related to high lipid solubility and storage in fatty tissues along with slow elimination. It decreases intracranial pressure, reduces cerebral blood flow, and maintains cerebral perfusion-to-metabolism ratio with cerebral vascular vasoconstriction at low to moderate doses (Omoigui, 1995). It is the most desirable agent for low excitatory effects such as myoclonus (Sebel & Lowdon, 1989). Mircea, et al. (1985) noted thiopental is used in

Table 1. Anesthetic Induction Agents

| Agent | Advantages | Disadvantages |
|---|---|---|
| thiopental | hypnosis, anesthesia, anterograde amnesia, decreased intracranial pressure, reduced cerebral blood flow, and maintained cerebral perfusion-to-metabolism ratio with cerebral vascular vasoconstriction at low to moderate doses, low excitatory effects such as myoclonus. (Omoigui,1995, Sebel & Lowdon, 1989) | antianalgesic, cumulative with repeated doses, histamine release with rapid intravenous administration, exacerbates intermittent porphyria; transient decrease in blood pressure and tachycardia with unchanged myocardial contractility and a carotid baroreceptor response with an increase in sympathetic nervous system activity. Large doses may produce direct myocardial depression. Hypovolemic patients may experience a marked hypotension and decrease in cardiac output and coronary perfusion pressure. There is a dose-dependent respiratory depression, laryngospasm, emergence delirium, nausea and vomiting, necrosis, and gangrene. It potentiates central nervous system and circulatory depressant effects of alcohol, narcotics, hypnotics, and volatile anesthetics. Liver enzyme induction by thiopental may lead to tolerance of barbiturates, physical dependence, and altered drug interactions. Responses may result in accelerated metabolism of other drugs such as oral anticoagulants, tricyclic antidepressants, and phenytoin. (Omoigui, 1995, Stoelting, 1991) |
| propofol | more rapid, clear emergence from anesthesia than thiopental, amnestic, low incidence of nausea and vomiting. More effective in blunting the pressor response to laryngoscopy than thiopental. Heart rate remains unchanged with propofol. (Stoelting, 1991, Omoigui, 1995, Sebel and Lowdon, 1989) | May have a slight histamine release, contraindicated in patients allergic to eggs and soybean oil. May cause apnea, bradycardia, and heart block. Hypotensive effects are greater in propofol than comparable thiopental doses and is secondary to direct myocardial depression and decrease in systemic vascular resistance. May see seizures. The decreased cerebral perfusion, intracranial pressure, and cerebral metabolic rate potentiates central nervous system and circulatory depressant effects of narcotics, volatile anesthetics, and neuromuscular blockade of nondepolarizing muscle relaxants. There are no preservatives in the emulsion and strict aseptic technique is needed. (Omoigui, 1995, Sebel and Lowdon, 1989, Stoelting, 1991) |

combination with succinylcholine for ultra-rapid induction. A significant hepatocyte dysfunction must be present before prolonged duration of action of barbiturates is noted (Stoelting ,1991). Elimination is primarily by hepatic metabolism with 10-24% metabolized by the liver per hour and less than 1% is excreted by the kidneys unchanged (Stoelting, 1991).

Omoigui (1995) noted contraindications for the use of thiopental include use in patients with a history of asthma related to histamine release when administered rapidly intravenously, and porphyrias as result of stimulation of the activity of the enzyme d-aminolevulinic acid synthetase that increases the production of heme and exacerbates intermittent porphyria.

Major adverse reactions include transient decrease in blood pressure due to histamine release and compensatory tachycardia with an unchanged myocardial contractility mediated by carotid sinus baroreceptor mechanism (Stoelting, 1991). Large doses of thiopental may produce direct myocardial depression. Hypovolemic patients may be unable to compensate for the reductions in peripheral vascular resistance and experience marked hypotension and decrease in cardiac output and coronary perfusion pressure. Liver enzyme induction is increased after several days of sustained thiopental administration which leads to tolerance of barbiturates, physical dependence, and altered drug interactions. Responses may result in accelerated metabolism of other drugs such as oral anticoagulants, tricyclic antidepressants, and phenytoin (Stoelting, 1991). Thiopental causes respiratory depression with a dose-dependent decrease in respiratory rate, apnea, laryngospasm,

emergence delirium, nausea and vomiting, excessive salivation, thrombophlebitis, necrosis, and gangrene. The drug potentiates central nervous system and circulatory depressant effects of alcohol, narcotics, hypnotics, and volatile anesthetics (Omoigui, 1995).

Propofol is an alkyl phenol intravenous hypnotic and its properties are summarized in Table 1. Onset is 40 seconds and duration of action is 5-10 minutes with a high lipid solubility (Omoigui, 1995). If given without narcotics or premedication for induction, the induction dose is 2-2.5 mg/kg (with reduction in dosage for the elderly) given slowly over 30 seconds in 2-3 divided doses results in a smooth induction (Sebel & Lowdon, 1989). Elimination is primarily by hepatic metabolism with a half-life elimination of 0.5 to 1.5 hours (Stoelting, 1991). There is a more rapid, clear emergence from anesthesia than thiopental. Sebel & Lowdon (1989) report that reliable anesthetic properties are seen with propofol and excitatory effects such as myoclonus are slightly higher than thiopental with induction dose with no additive or adverse effects with vecuronium, succinylcholine, or atracurium. There is a discrepancy in the findings with respect to histamine release and anaphylaxis with Omoigui (1995) reporting positive findings and Sebel & Lowdon (1989) reporting that there is no histamine release or anaphylactic response with propofol in the current emulsion formulation. Stoelting (1991) reports that propofol is more effective in blunting the pressor response to laryngoscopy than thiopental. Heart rate remains unchanged with propofol where as with thiopental, rapid

intravenous injection stimulates a carotid baroceptor mediated increase in sympathetic nervous system activity. A low incidence of nausea and vomiting is reported by Sebel & Lowdon (1989) and Omoigui (1995). White & Smith (1993) report that the favorable profile of low side effects and rapid clearance of propofol has made it the intravenous anesthetic of choice in the outpatient setting. Contraindications are use in patients who have allergies to eggs and soybean oil as reported by Sebel & Lowdon (1989) and Omoigui (1995).

Major adverse reactions include apnea, hypotension, and bradycardia (Sebel & Lowdon, 1989). Hypotensive effects are greater in propofol than comparable thiopental doses and arrhythmias, such as bradycardia and heart block are noted on occasion (Stoelting, 1991). Omoigui (1995) reports hypotension is secondary to direct myocardial depression and decrease in systemic vascular resistance. Stoelting (1991) also reports respiratory depression, bronchospasm, seizures, decreased cerebral perfusion, decreased intracranial pressure. And sexual illusions were reported by Sebel & Lowdon (1989). Stoelting (1991) states there are no preservatives in the emulsion and it must be used with strict aseptic technique to decrease the possibility of growth of bacteria and is a single use vial. The drug potentiates central nervous system and circulatory depressant effects of narcotics, volatile anesthetics, and neuromuscular blockade of nondepolarizing muscle blockers (Omoigui, 1995).

## Neuromuscular Blockers

Atracurium is a nondepolarizing skeletal muscle relaxant and its properties are shown in Table 2. Atracurium has an onset of less than 3 minutes and an intermediate duration of action of 20-35 minutes (Ezekiel, 1995 and Omoigui,1995). The intubation dose is 0.3-0.5 mg/kg. It has less cumulative effect on recovery rate than other muscle relaxants with repeated doses (Mirakur, 1994 and Omoigui, 1995). Feldman (1994) reports good intubation conditions at 180 seconds. White & Smith (1993), report that the problems related to reversal of long acting neuromuscular blockers has been eliminated by the intermediate acting nondepolarizing neuromuscular agents. Reduction in the amount of anticholinesterase agents necessary to reverse the intermediate agents with a decreased potential for recurarization post operatively is reported by Mirakhur (1994). Hunter (1994) reports atracurium is the preferred neuromuscular relaxant agent in patients with renal disease because of its breakdown by Hoffman degradation and ester hydrolysis. Omoigui (1995) recommends use with caution in patients with history of anaphylactoid reactions and bronchial asthma related to histamine release.

Major adverse reactions are associated with histamine release, production of laudanosine metabolite, and include hypotension, vasodilation, sinus tachycardia, sinus bradycardia, hypoventilation, apnea, dyspnea, bronchospasm, and laryngospasm. Histamine release and hemodynamic changes are minimal within recommended dose range and given slowly. Its primary metabolite is laudanosine, a cerebral stimulant with potential of stimulating seizure activity (Mirakhur, and Omoigui, 1995).

Table 2. Neuromuscular blockers

| Agent | Advantages | Disadvantages |
|---|---|---|
| atracurium | less cumulative effect on recovery rate than other relaxants, decreased potential for recurarization post operatively; preferred agent in patients with renal disease because of its breakdown by Hoffman degradation and ester hydrolysis. (Mirakhur, 1994; Omoigui, 1995; Hunter, 1994) | histamine release, and laudanosine metabolite which may stimulate seizure activity; hypotension, vasodilation, sinus tachycardia, or bradycardia, hypoventilation, apnea, bronchospasm, and laryngospasm. (Mirakhur, 1994; Omoigui, 1995) |
| rocuronium (zemuron) | onset is comparable to succinylcholine with an intermediate duration of action; most rapid onset of any nondepolarizing muscle relaxant. It has minimal changes in intraocular pressure and no significant effect on intracranial pressure. It demonstrates stable cardiovascular effects and low incidence of histamine release. (Feldman, 1994; Wicks, 1994) | neuromuscular blockade is potentiated by other drugs such as aminoglycosides, antibiotics, local anesthetics, loop diuretics, and volatile anesthetics. It may demonstrate transient tachycardia, hypoventilation, apnea, bronchospasm, pulmonary hypertension, and injection site edema. (Omoigui, 1995) |
| succinylcholine | most rapid onset of neuromuscular blockade for rapid intubation. (Hunter, 1994; Wicks, 1994) | in renal failure, it can potentiate cardiac arrhythmias and arrest by increasing potassium levels producing hyperkalemia, muscle pain from muscular fasiculations, and decrease levels of psuedocholinesterase may increase risk of prolonged apnea. It is the most frequently incriminated drug causing anaphylactoid reactions. It is associated with malignant hyperthermia and rhabdomyolysis. (Hunter, 1994; Mircea, Constantinescu, Constantinescu, Daschievici, Straja, Ungureanu, & Leoveanu, 1985; Mirakhur, 1994; Omoigui, 1995) |

Rocuronium is a rapid acting steroidal nondepolarizing neuromuscular relaxant and its properties are shown in Table 2. The onset of rocuronium is 45-90 seconds and duration is intermediate within 15-150 minutes Omoigui (1995). Puhringer, Khuenl-Brady, Koller, and Mitterschiffthaler (1992), Wicks (1994), and Hunter (1994), report that the onset is comparable to succinylcholine and that the duration of action is similar to vecuronium. Feldman (1994) and Wicks (1994) report that rocuronium has the most rapid onset of any other nondepolarizing muscle relaxant with excellent and smooth intubation conditions at 90 seconds with 600 ug/kg and reports ready reversal with anticholinesterase drugs. Omoigui (1995) recommends intubation dose 0.6-1.2 mg/kg. Mirakur (1994) reports that rocuronium should be useful for routine and rapid sequence intubations without prolonged muscle relaxant block at usual intubation doses. Mirakhur (1994) and Robertson, Hull, Verbeek, & Bonjii (1994) report minimal changes in intraocular pressure and no significant effect on intracranial pressure. Omoigui (1995) reports predominant hepatic clearance. Wicks (1994) and Feldman (1994) report stable cardiovascular effects. Mirakhur (1994) reports increased transient tachycardia and no significant interaction with commonly used antibiotics given for prophylaxis. Omoigui (1995) reports neuromuscular blockade is potentiated by other drugs such as aminoglycosides, antibiotics, local anesthetics, loop diuretics, and volatile anesthetics. Wicks (1994) reports a low incidence of histamine release.

Major adverse effects of rocuronium include tachycardia, hypoventilation, apnea, bronchospasm, pulmonary hypertension, and injection site edema (Omoigui,

1995). Mirakhur (1994) reports rocuronium should be used with caution in advanced renal and hepatic disease.

Suxamethonium (succinylcholine) is an ultrashort acting depolarizing skeletal muscle relaxant. Its properties are shown in Table 2. It produces depolarizations observed as fasiculations. Onset is 30-60 seconds with duration of action 4-6 minutes and intubation dose 0.7-1 mg/kg (Omoigui, 1995). Ideal intubation time is reached in 45 seconds (Feldman, 1994). Suxamethonium is metabolized by plasma cholinesterase (Hunter, 1994). Low levels of plasma cholinesterase (pseudocholinesterase) in renal disease does not usually alter the duration of action of the agent, but with the increased concentration of serum potassium in renal failure, use of suxamethonium can potentiate cardiac arrhythmias and arrest by increasing potassium concentrations producing hyperkalemia (Hunter, 1994 and Mircea, et al. 1985). Bradycardia of vagal origin, muscle pain from muscular fasiculations, increased intrabdominal pressure and regurgitation risk from abdominal muscle fasiculations are noted by Mircea, et al.(1985). Mircea, et al. (1985) also note that decreased levels of pseudocholinesterase may increase risk of prolonged apnea with use of suxamethonium. Suxamethonium is the most frequently incriminated drug in anaphylactoid reactions with marked tachycardia, hypotension, and bronchospasm (Mirakhur, 1994). Mirakhur (1994) and Omoigui (1995) note marked and significant increase in intraocular pressure. There is a clinically insignificant histamine release (Omoigui, 1995).

Contraindications include use in malignant hyperthermia susceptible patients and severe hyperkalemic status as in burn patients, severe trauma, spinal-cord injury (Omoigui, 1995).

Major adverse reactions include increased intraocular pressure, hypotension, bradycardia, arrhythmias, tachycardia, hypertension, hypoventilation, apnea, anaphylactic reaction, malignant hyperthermia, and myoglobinemia. If succinylcholine is administered to a patient with undiagnosed myopathies, acute rhabdomyolysis may be noted (Omoigui, 1995).

## Statement of the Problem

With the variety of agents to choose from, it was unknown which induction agents and neuromuscular blockers were used most frequently by anesthesia providers. It was also unknown if the level of anesthesia experience was related to the choice of agents.

## Research Questions

The purpose of this study was to measure the frequency of use of intravenous agents for induction and intubation, and to determine if there is a relationship between the level of experience of the anesthesia providers and choice of induction and intubation agents.

The questions answered by this study were:

(1) What is the choice of intravenous induction and intubation agents for general anesthesia?

(2) Do patient variables make a difference in the choice of agents? (age, gender, ASA number)

(3) Do provider variables make a difference in the choice of agents? (experience, certified registered nurse anesthetist, anesthesiologist)

## Definitions

The operational definitions of the key concepts of this study are:

(1) intravenous induction agent-the drug used for induction of anesthesia.

(2) general anesthesia-occurs when the patient has lost sensation and consciousness (McDonough, 1994).

(3) technique-use of intravenous agent for induction of anesthesia (Vercellino, 1992).

(4) experienced-is seen as a passage of time and background of experiences with an intuitiveness of each situation with refinement of preconceived notions (Benner, 1984).

(5) most experienced-refers to the anesthesia providers with greater than four years experience in providing anesthesia post training.

(6) least experienced-refers to the anesthesia provider with less than or equal to four years experience in providing anesthesia post training and after certification.

(7) ASA 1 classification-refers to the physical status of the patient being normally healthy (Ezekiel, 1995).

(8) ASA 1E classification-are normally healthy patients requiring emergency operations (Ezekiel, 1995).

(9) ASA 2 classification-patient with a controlled mild systemic disease (Ezekiel, 1995).

(10) ASA 3 classification-patient with severe systemic disease (Ezekiel, 1995).

(11) Anesthesia providers-are defined as follows:

(a) A certified registered nurse anesthetist is:

Graduate from an approved school of nursing and hold current state licensure as a registered nurse. Graduate from a nurse anesthesia educational program accredited by the American Association of Nurse Anesthetists (AANA) Council on Accreditation of Nurse Anesthesia Educational Programs or its predecessor. Successfully complete the certification examination administered by the AANA Council on Certification of Nurse Anesthetists or its predecessor. Comply with criteria for biennial recertification, as defined by the AANA Council on Recertification of Nurse Anesthetists (Foster & Jordan, 1994, p. 4).

(b) An anesthesiologist is a graduate of a medical school; a licensed physician who has obtained specialty training in the practice of giving anesthesia (Malignant Hyperthermia, 1992).

## Limitations

When collecting data, it was noted that the surgical logbook and medical records were found to be illegible at times and incomplete for entries. 300 charts were reviewed covering a time period of three years to obtain the 90 charts used in this study. The data collecting time was greatly increased due to this record keeping.

By only using one hospital for the study, the agents used were limited to what was available at that institution. The instruments used for this study were newly devised by researcher and may limit the reliability and validity of the study.

The ASA classifications of the case scenarios were given to avoid choosing a standard agent protocol. It was noted that during the qualitative interview, some of the anesthesia providers mentioned they would treat the scenario as a different ASA classification such as in scenario #1 with an ASA 2 classification quoting "I would treat this case as a full-stomach and use rapid sequence induction". And in scenario #2 an ASA 1 was given and several providers suggested: "I believe this lady is obese and would treat her as a full-stomach and use rapid sequence induction".

## Assumptions

One assumption of this study was the more experienced provider has greater than four years experience. The other assumption was that the less experienced provider is equal to or less than four years.

# CHAPTER 2

# REVIEW OF THE LITERATURE

Previous studies provide information on the personal choice of anesthetic techniques among anesthesiologists (Katz, 1973; Broadman, Mesrobian, & McGill, 1987). One study identified the choice of anesthetic techniques among nurse anesthetists (Dewan & Rosenberg, 1988). In 1973, Katz performed a survey to identify preferences of anesthetic techniques among anesthesiologists, (Katz, 1973). The survey was sent to physicians listing their major clinical specialty as anesthesiology. The number of subjects in this study was 3,651. The survey asked the respondents which technique and agent they would prefer if they were to receive anesthesia. The majority (68%) of the respondents chose regional anesthesia over general anesthesia. If general anesthesia were the only choice, 58% chose halothane, 32% nitrous oxide, 5% cyclopropane, 3% methoxyflurane, and 1% fluroxene and ether. Katz correlated the data with the following variables; providers age range, type of practice, certification of American Board of Anesthesiology (ABA), and years of experience. Of the 68% preferring regional most were:

(1) under 40 years of age

(2) not certified by ABA

(3) residents

(4) in academic practice

(5) had under 12 years of practice

Of the 32% preferring general anesthesia most were:

(1) over 40 years of age

(2) certified by ABA

(3) worked in non-academic centers

(4) had over 12 twelve years of practice

A survey was performed by Broadman, Mesrobian, & McGill in 1987 to determine if anesthesiologists continued to have a personal preference to receive regional anesthesia over general anesthesia since the Katz survey in 1973 and if demographic variables influenced their choice. A random group of 446 anesthesiologists were surveyed with a response of 214 (48%). The anesthesiologists were given two scenarios and asked to give their preference of regional or general anesthesia technique in ASA 1 or ASA 1E classifications. The first scenario was for a broken tibia sustained immediately after eating lunch scheduled for open reduction and internal fixation in two to four hours. The second scenario was in six months to be performed electively for removal of the tibial plate placed during the first surgery. The choice of regional anesthesia technique (91.6%) was preferred over general anesthesia in emergency surgery with regional technique preferred to a lesser degree (73.9%) in elective surgery. No differences in choice of anesthetic technique was identified with greater than or less than 15 years anesthesia experience or geographical location of practice. Providers less than 40 years of age preferred regional technique more frequently than older providers.

A similar study among CRNAs was performed by Dewan & Rosenberg in 1988 which identified CRNAs' preferences to receive anesthesia and if demographic variables influenced their choices. There were 500 CRNAs randomly chosen to receive questionnaires with 311 (62.2%) responses. The CRNAs responses were similar to the Broadman et al. study for emergency surgery with respondents (98.1%) choosing regional anesthesia. There is also a notable difference in the respondents preference for regional during elective surgery (95.5%) as a personal preference. The years of anesthesia practice or geographical location did not influence the CRNAs' choice of technique.

## Framework

Patricia Benner (1984) stated that as experience increases there is improved knowledge of choice. Benner's theory notes the qualitative nature of choices of providers based on their education, skills acquired, and the number of experiences in various situations in the provider's chosen career field.

Benner applied the Dreyfus model of skill acquisition and identified five skill areas in clinical nursing practice: novice, advanced beginner, competent, proficient, and expert. She detailed the beginning of experience with acquiring skills, learning to be consistent and predictable, and managing time.

The novice level experience ranges from no previous background (graduate nurse) to an experienced nurse being placed in an unfamiliar area of practice. A novice in anesthesia is an experienced nurse or physician with no previous

background in providing anesthesia. The technical skills of the practice are learned at this level. The advanced beginner level is attained when the novice has experienced some situations and can perform the skills required of the new area of practice. This level can be utilized for an extended period of time. The competent level is reached after the advanced beginner has had a great deal of experience in handling situations and experiences in the area of practice. The competent provider is knowledgeable and has the analytical ability to cope and manage more varying situations than the novice or advanced beginner. The competent provider makes conscious and deliberate plans which provides efficiency and is more organized than the novice and beginner. The proficient level is reached as the provider has learned from experience what to expect in situations and perceives how to modify plans in response to changes in these situations. As experience increases, the provider demonstrates increased confidence, knowledge, and ability. When the provider has developed an intuitive grasp of situations with a large degree of experience in a variety of situations and no longer relies on analytical principles to guide practice, the expert level has been reached.

According to Benner's framework, some providers may not progress from one level to the next. They may be unable to adequately perform the technical or analytical skills required in the novice and competent levels or develop the intuitive ability needed to reach the expert level.

Benner believes that choices of care provided to patients are qualitative in nature and with increased experience and knowledge there is an increase in skill level where one is able to move from novice to expert. In this study, emphasis was placed

on determining if experience level (according to Benner's skill levels) of the provider made a difference in the choice of anesthetic provided.

The previous three studies noted that experience did not make a difference in choice of anesthetic technique. These studies did not have a qualitative focus and the physical status of the patient was ideal (ASA 1 or 1E). These studies also focused on a more personal preference by having the providers place themselves as the patient. By using an increased ASA level and qualitative interview, this study provided an opportunity for the level of experience of the provider to be an independent variable in the choice of induction and intubation agents as well as detailed reasons for the choice. It was not the intention of this study to determine which providers gave the best care, but simply to see if there was a difference in choice of agents as experience increased.

# CHAPTER 3

# METHODOLOGY

## Research Design

The retrospective portion of the study used a descriptive research design. There was no manipulation of variables and only situations as they naturally occurred were observed. The frequencies of use of intravenous induction and intubation agents, age of patient, gender, and ASA classification were obtained.

The qualitative portion of the study also used a descriptive research design. The reasons why providers chose specific agents for the scenarios they were presented were documented. These data gave further insight into choice of agents.

## Sample

The study was performed at a military hospital with approximately 160 beds in the mid-eastern seaboard area. The Institutional Review Board (IRB) approved the study prior to collection of data. The 16 anesthesia providers at this institution can be considered to be a representative sample of the target population of all licensed anesthesia providers in the United States. The 16 providers were asked by the researcher to participate in the study and given a form to read (Appendix A) detailing the study. Thirteen providers agreed to participate in the study.

The 13 providers were active duty military anesthesiologists or Certified Registered Nurse Anesthetists (CRNAs). They were from different geographical locations in the U.S. and had varied experiences in providing anesthesia care. The

age range was 32 to 47 years of age and anesthesia training and education was at either military or civilian institutions.

The surgical log book was used to obtain a list of surgical cases provided by the anesthesia providers participating in the study where patients received general anesthesia and intubation. The parameters set for the patient population of this study were: 18 to 69 years of age, no known allergies, no previous personal or family history of complications with anesthesia. There were no obstetrics, pediatrics, or infants' charts surveyed in order to eliminate fetal, newborn, and pediatric implications of the agents being utilized in adults.

## Instrumentation

Two forms were used to collect data; (1) Provider interview schedule for intravenous induction agent and intubation neuromuscular blocker survey (Appendix B) and (2) Chart review form for choice of intravenous induction agent and intubation neuromuscular blocker survey (Appendix C). The provider interview schedule gathered information about the providers and determined their choice of agents in the case scenarios. (Appendix B). Data were obtained on the provider's status (CRNA or anesthesiologist), years of experience providing anesthesia, their choice of agents in each scenario, and their reasoning for the choices.

This tool enabled the researcher to document the anesthesia providers choice of agents in the scenarios. It also provided the opportunity to discern if provider's status and experience made a difference in the choice of agents.

The patient variables affecting an anesthesia provider's choice of anesthesia and neuromuscular blocker for intubation were used as guidelines for developing the chart questionnaire used in this study (Vercellino, 1992). (Appendix C). This tool provided the researcher with the information to answer the questions regarding the types of intravenous induction agents and neuromuscular blockers being used by anesthesia providers during general anesthesia.

By combining qualitative and quantitative approaches in a comparison of data by some of the patient and provider variables in the scenarios from the interviews and chart reviews, the findings of the study expanded beyond the case scenarios or frequency of agents used. These comparisons indicated if experience of the anesthesia providers influenced the type of anesthesia provided to the patients. The comparisons were used to provide an increase in reliability and validity as well as increasing the comprehensiveness of the study (Munhall & Boyd, 1993). Further reliability of the chart questionnaire can only be established with its use in future studies.

## Data Collection

The providers participating in the study were interviewed by the researcher using two case scenarios of ASA 1 and ASA 2 classifications. The setting for each patient to receive intravenous induction for general anesthesia and neuromuscular blockers for intubation was given. An interview schedule requesting the anesthesia providers's preference of agents for each scenario and short statements asking why they chose the agents along with the demographics for providers was completed by

the researcher at the time of the interview (Appendix B).

The researcher obtained the surgical log book and identified five to 10 patients with ASA 1, ASA 2, or ASA 3 classifications who received general anesthesia and endotracheal intubation during the past three years for most anesthesia care providers participating in the study. The charts were then pulled from medical records and a survey using a chart review form of patient demographics, intravenous induction agent, neuromuscular blocking agent for intubation, and provider identifying code was completed (Appendix C).

Confidentiality was maintained by assigning a number code to each provider. The licensure, title, and years of experience in anesthesia from time of post training to present was requested of all anesthesia providers.

Patients' charts were coded. Data results show patient demographics as aggregated frequencies which assures anonymity.

## Treatment of Data

In the qualitative analysis, the providers' reasons for choice of agents were summarized by words or themes. The quantitative data obtained in the chart review were summarized by frequencies of agents per CRNAs and anesthesiologists, as well as by the experience of the provider. Frequency of intravenous agents used for induction and neuromuscular blockers for intubation, patient age, gender, and ASA status were also summarized. The provider interview schedule data were compared with the chart review data.

# CHAPTER 4

# RESULTS

Ninety anesthetic records for 11 anesthesia providers were reviewed for the quantitative data obtained in this study. Two providers did not have cases that met the study parameters. Of the three intravenous induction agents chosen by CRNAs (n=8) and anesthesiologists (n=3), propofol was chosen more frequently than thiopental or fentanyl. (Figure 1 and Table 3.)

Anesthesia providers with less than four years clinical experience chose propofol more frequently than thiopental or fentanyl. Providers with greater than four years experience also chose propofol more than thiopental. (Figure 2 and Table 3.)

Patients with ASA 1 (n=30) and most ASA 2 (n=52) classifications were given propofol more frequently than thiopental. The patients with an ASA 3 (n=8) classification were given only thiopental. (Table 3.)

Propofol was chosen more frequently in the age group 18-49 than thiopental or fentanyl. (Table 3.) Induction agents in the age group 50-59 were equally distributed between propofol and thiopental. Thiopental was chosen more frequently than propofol in the 60-69 age group. (Table 3.)

There were 58 female and 32 male patient anesthesia records reviewed. Propofol was chosen more frequently as an induction agent for women than thiopental or fentanyl. (Table 3.) Thiopental and propofol were equally chosen for men. (Table 3.)

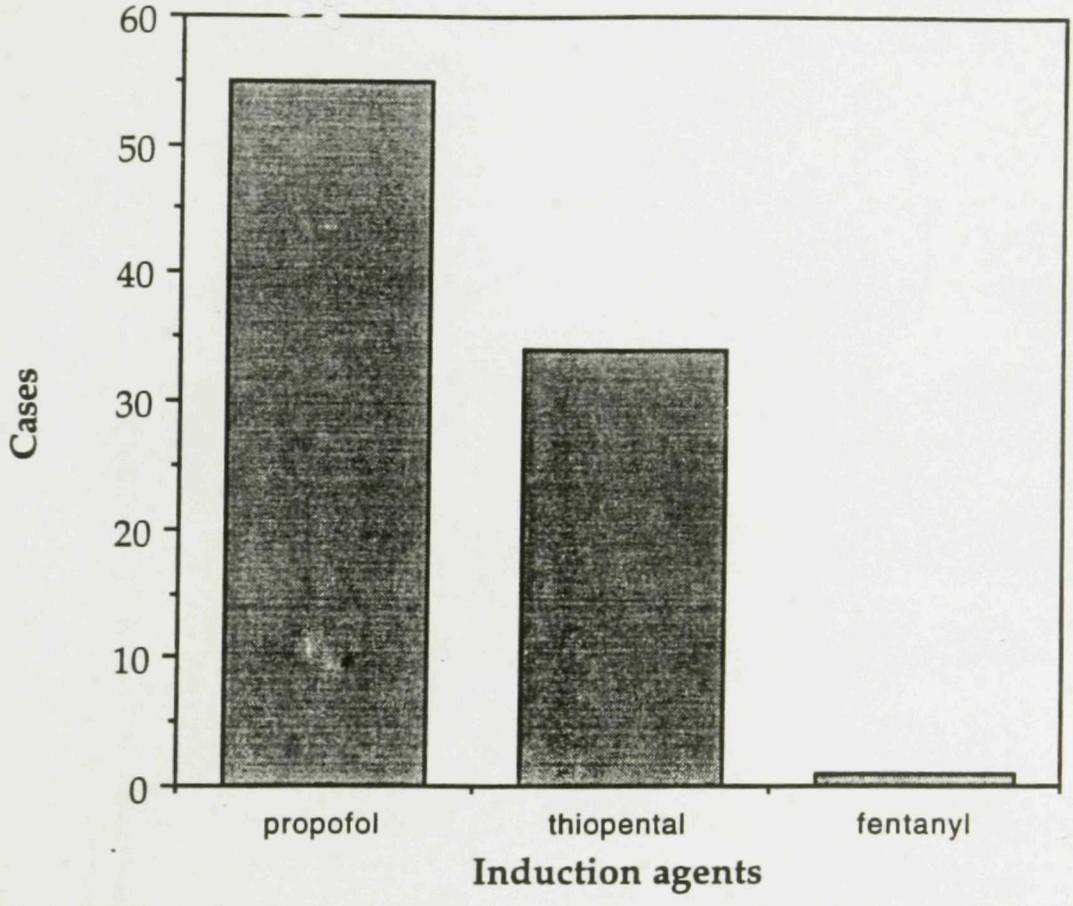
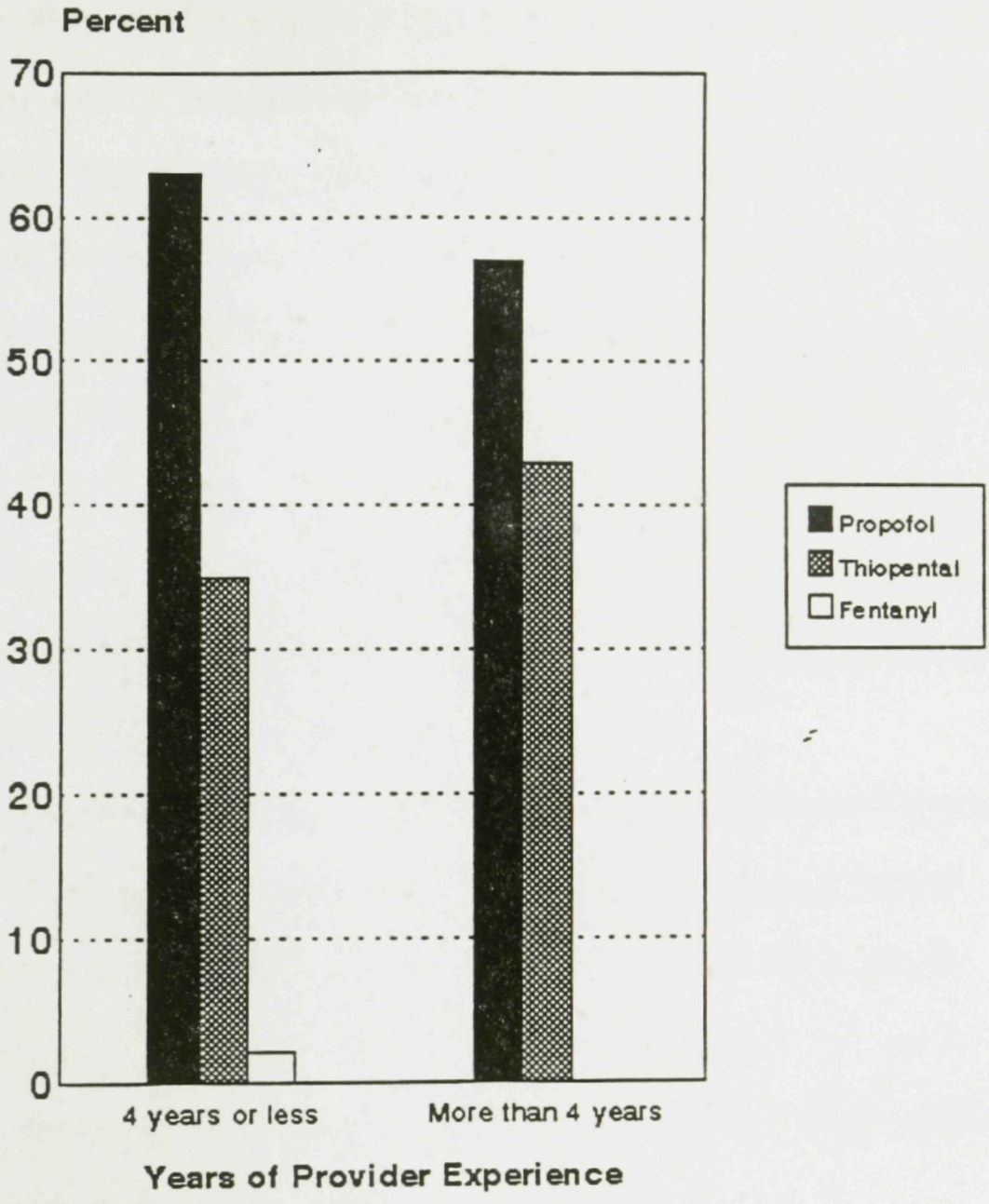



Figure 1. Provider choice of induction agent identified in review of anesthetic records from April 1993 to February 1996.

| Table 3. Choice of induction agents identified in review of anesthetic records by study variables. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Study variables | Total | | Thiopental | | Propofol | | Fentanyl | |
| | number | percent | number | percent | number | percent | number | percent |
| Total | 90 | 100 | 34 | 38 | 55 | 61 | 1 | 1 |
| CRNA | 70 | 100 | 27 | 39 | 42 | 60 | 1 | 1 |
| MDA | 20 | 100 | 7 | 35 | 13 | 65 | 0 | 0 |
| Experience | | | | | | | | |
| less than four years | 60 | 100 | 21 | 35 | 38 | 63 | 1 | 2 |
| more than four years | 30 | 100 | 13 | 43 | 17 | 57 | 0 | 0 |
| ASA classification | | | | | | | | |
| 1 | 30 | 100 | 8 | 27 | 22 | 73 | 0 | 0 |
| 2 | 52 | 100 | 18 | 35 | 33 | 63 | 1 | 2 |
| 3 | 8 | 100 | 8 | 100 | 0 | 0 | 0 | 0 |
| Patient-age | | | | | | | | |
| 18-29 | 19 | 100 | 5 | 26 | 14 | 74 | 0 | 0 |
| 30-39 | 25 | 100 | 8 | 32 | 16 | 64 | 1 | 4 |
| 40-49 | 17 | 100 | 5 | 29 | 12 | 71 | 0 | 0 |
| 50-59 | 16 | 100 | 8 | 50 | 8 | 50 | 0 | 0 |
| 60-69 | 13 | 100 | 8 | 62 | 5 | 38 | 0 | 0 |
| Patient-gender | | | | | | | | |
| male | 32 | 100 | 16 | 50 | 16 | 50 | 0 | 0 |
| female | 58 | 100 | | 31 | 39 | 67 | 1 | 2 |

**Figure 2. Induction agent choice by provider experience**





Of the 90 anesthetic records reviewed, three neuromuscular blockers were chosen most often: succinylcholine, mivacron, and vecuronium. (Table 4 and Figure 3.) Providers with less and more clinical anesthesia experience chose succinylcholine more frequently than mivacron or vecuronium. (Table 4 and Figure 4.) Patients with ASA 1 and ASA 2 classifications were given succinylcholine more frequently than any other neuromuscular blocking agent. ASA 3 patients were given succinylcholine and vecuronium with an even distribution of these two neuromuscular blocking agents. (Table 4.) Succinylcholine was chosen most frequently for ages 18-29 and 40-69. Mivacron was chosen most frequently for ages 30-39. (Table 4.) Of the 58 females and 32 males, succinylcholine was chosen more frequently in females and males than other neuromuscular blocking agents.

The qualitative results of the study were obtained by personal interviews of 13 anesthesia providers. The questions from the interview were designed to gather demographics about the providers, and to obtain individual responses to specific scenarios. (Appendix B.) There were 10 males and three females. Of these 13, eight were CRNAs and five were anesthesiologists. Their years of clinical anesthesia experience range from two to 14 years.

The results focus on reasons given for use of the agents chosen for induction and intubation by least and most experienced anesthesia providers. (Appendix D.) In the first scenario, the anesthesia providers with less experience chose thiopental more frequently than propofol for an induction agent with most stated reasons "cheaper than propofol, readily available, used for rapid sequence induction, taught to use for rapid

Table 4. Choice of neuromuscular blockers identified in review of anesthetic records by study variables.

| Study variables | Total | | succinylcholine | | mivacron | | vecuronium | | atracurium | | other | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | number | percent | number | percent | number | percent | number | percent | number | percent | number | percent |
| Total | 90 | 100 | 46 | 51 | 22 | 25 | 14 | 16 | 3 | 3 | 5 | 5 |
| CRNA | 70 | 100 | 37 | 53 | 16 | 23 | 10 | 14 | 3 | 4 | 4 | 6 |
| MDA | 20 | 100 | 9 | 45 | 6 | 30 | 4 | 20 | 0 | 0 | 1 | 5 |
| Experience | | | | | | | | | | | | |
| less than four years | 60 | 100 | 34 | 57 | 13 | 22 | 9 | 15 | 0 | 0 | 4 | 6 |
| more than four years | 30 | 100 | 12 | 40 | 9 | 30 | 5 | 17 | 3 | 10 | 1 | 3 |
| ASA classification | | | | | | | | | | | | |
| 1 | 30 | 100 | 16 | 53 | 8 | 27 | 3 | 10 | 2 | 7 | 1 | 3 |
| 2 | 52 | 100 | 26 | 50 | 14 | 27 | 7 | 13 | 1 | 2 | 4 | 8 |
| 3 | 8 | 100 | 4 | 50 | 0 | 0 | 4 | 50 | 0 | 0 | 0 | 0 |
| Patient-age | | | | | | | | | | | | |
| 18-29 | 19 | 100 | 9 | 47 | 5 | 26 | 2 | 11 | 1 | 5 | 2 | 11 |
| 30-39 | 25 | 100 | 10 | 40 | 13 | 52 | 1 | 4 | 0 | 0 | 1 | 4 |
| 40-49 | 17 | 100 | 10 | 59 | 2 | 12 | 4 | 24 | 0 | 0 | 1 | 6 |
| 50-59 | 16 | 100 | 7 | 44 | 2 | 13 | 5 | 31 | 1 | 6 | 1 | 6 |
| 60-69 | 13 | 100 | 10 | 77 | 0 | 0 | 2 | 15 | 1 | 8 | 0 | 0 |
| Patient-gender | | | | | | | | | | | | |
| male | 32 | 100 | 14 | 44 | 4 | 13 | 10 | 31 | 1 | 3 | 3 | 9 |
| female | 58 | 100 | 32 | 56 | 18 | 31 | 4 | 7 | 2 | 3 | 2 | 3 |

note: percents are rounded.

other includes arduan, pavulon, and zemuron.

CRNA=certified registered nurse anesthetist

MDA=anesthesiologist

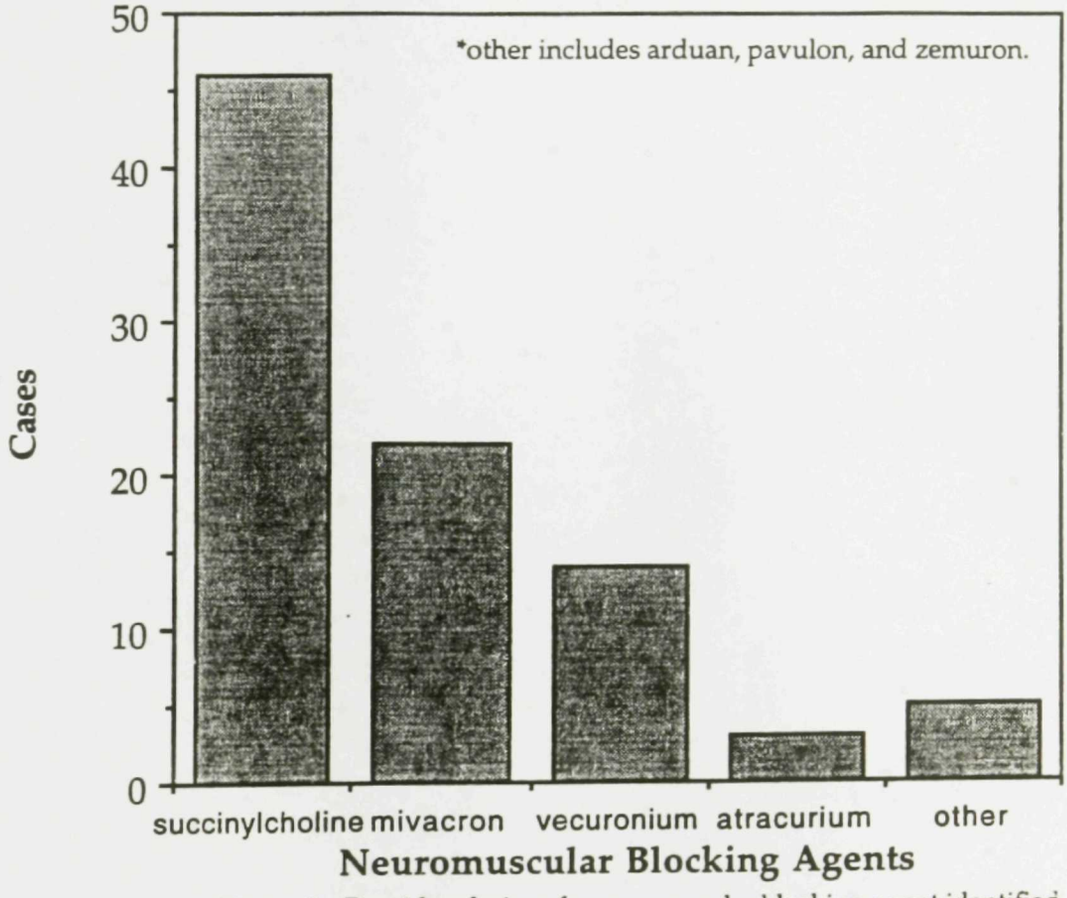
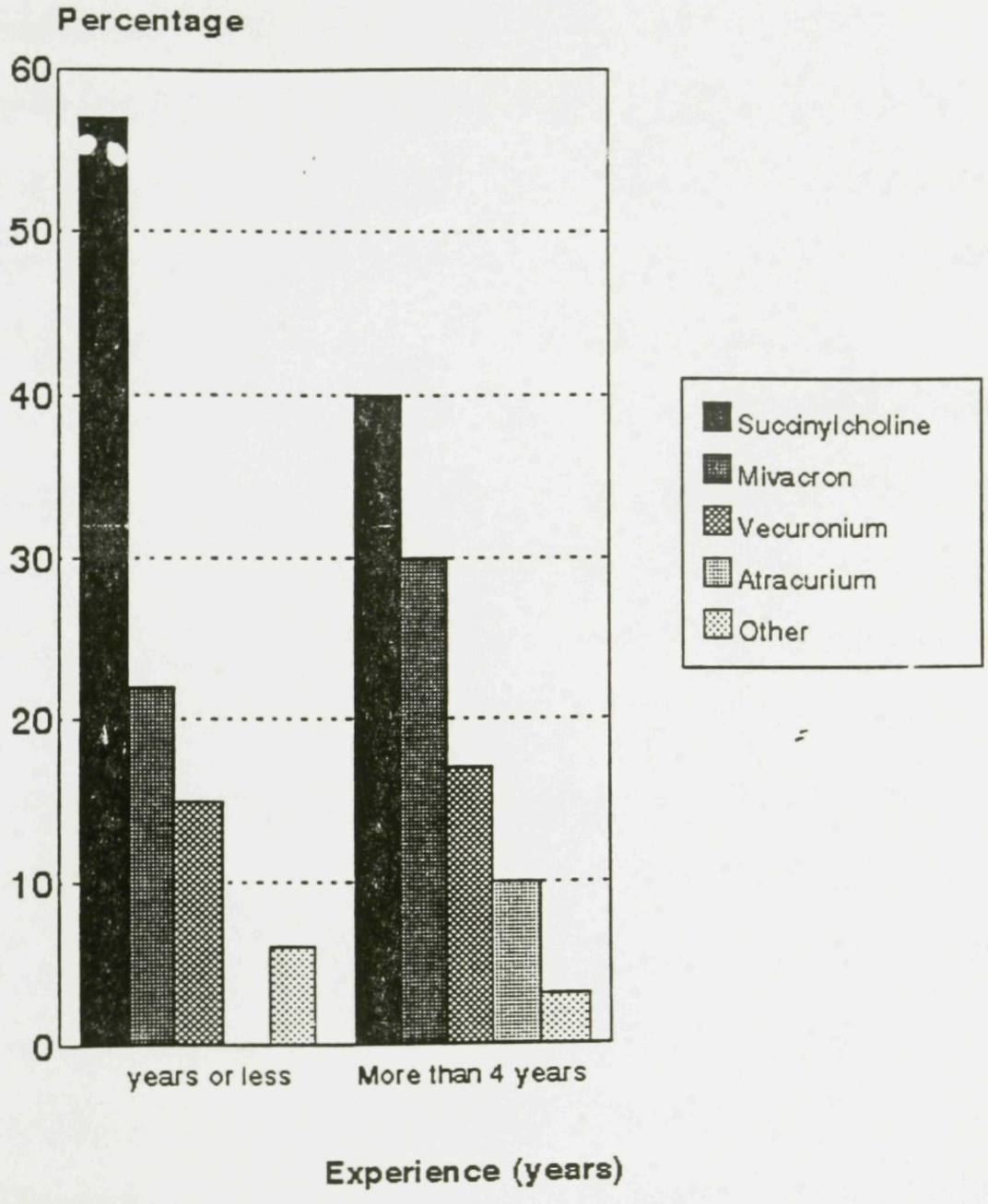



Figure 3. Provider choice of neuromuscular blocking agent identified in review of anesthetic records from April 1993 to February 1996.

**Figure 4: Neuromuscular blocking agent choice by provider experience**



sequence induction, good experience with this drug." Providers with the most experience chose thiopental and propofol equally stating "thiopental aides on decreasing isoflorane need" and "I use propofol out of personal choice and I was taught to use it for this kind of case". CRNAs chose propofol more frequently than thiopental while anesthesiologists chose thiopental more than propofol. All anesthesia providers chose succinylcholine more frequently for intubation than other neuromuscular blocking agents for scenario 1, with less experienced providers stating "cheap, availability, best in my experience for this case, I was taught to use it in this situation, use for rapid sequence induction." The most experienced providers stated "best to use for rapid sequence induction, it is my experience that it works faster and shorter than any other drug available." Mivacron was chosen once by a more experienced CRNA while the anesthesiologists all chose to use succinylcholine.

In the second scenario, the anesthesia providers with less experience chose propofol for induction more than thiopental stating "good choice for antiemetic effect, availability, personal choice of induction agents, experience in use." Most experienced providers chose only propofol stating "experience, education, and personal preference" as reasons. CRNAs chose to use propofol more than thiopental and again anesthesiologists chose thiopental more than propofol. As an intubation agent, anesthesia providers with less experience chose zemuron more frequently than succinylcholine or vecuronium stating "inexpensive, fastest nondepolarizing neuromuscular blocker on the market, I avoid succinylcholine in normal airway

related to post operative myalgias." Most experienced providers chose to use vecuronium more frequently.

# Chapter 5

## Conclusions

The major aims of this study were to identify the current use of the intravenous agents being chosen for induction and intubation by CRNAs and anesthesiologists and whether experience level of the provider made a difference in the choice of agents. The previous studies of Katz, 1973, Broadman, Mesrobian, & McGill, 1987, and Dewan & Rosenberg, 1988, focused on the choices among anesthesia providers to determine what anesthesia technique they would personally choose to receive in a given situation. Provider experience by years did not make a difference in these studies.

This study was designed to address several questions: What intravenous induction and intubation agents for general anesthesia are being chosen by anesthesia providers? Do patient variables make a difference in the choice of agents? Do provider variables make a difference in the choice of agents? Utilizing Benner's theory, a qualitative approach was added to the present study to determine if experience was a factor in providers' choices of anesthetic agents for induction and intubation.

After identifying and interviewing the anesthesia providers participating in this study, surgical logbooks were used to obtain the names of patients provided anesthesia by the participating providers. Some of the providers were new at the institution and only a few of their cases met the study criteria. Data collection time was increased

because there were incomplete and illegible entries in the logbook and anesthesia records. Three hundred charts were reviewed to obtain 90 anesthesia records which met the study criteria.

Analysis of the quantitative and qualitative data indicates that the most frequently chosen intravenous agents are propofol and thiopental. The quantitative data from the chart reviews and qualitative data from scenario #2 (Appendix B) indicate that propofol was chosen more frequently by all providers regardless of provider status (CRNA and/or anesthesiologist) or provider experience. In the qualitative data, reasons cited for the choice of propofol were "antiemetic effect, experience, shorter acting." Provider experience made a slight difference in the choice of agents used for induction in scenario #1 (Appendix B) with least experienced anesthesia providers choosing thiopental, citing as reasons "education, cheap, produces rapid hypnosis and unconsciousness, and prescribed for rapid sequence induction." Those with more experience chose thiopental and propofol equally.

Analysis of the quantitative chart review and qualitative data from scenario #1 (Appendix B) indicates that succinylcholine was chosen more frequently by all providers regardless of provider type (CRNA and/or anesthesiologist) or provider experience. Reasons cited for this choice were "training, experience, rapid sequence induction." The analysis of qualitative data from scenario #2 (Appendix) indicates that providers chose equally between vecuronium and zemuron. CRNAs most frequent choice was vecuronium; anesthesiologists chose zemuron most frequently.

The least experienced providers chose zemuron, citing their reasons as "most rapid and cheap nondepolarizer." In contrast, the most experienced provider chose vecuronium citing "safest drug to use."

Each anesthesia provider is considered to be functioning on a competent level upon completion of anesthesia training and certification (Foster & Jordan, 1994). This study was conducted with an assumption that the least experienced anesthesia provider (less than or equal to four years clinical experience) was functioning on a competent level and the most experienced anesthesia provider (more than four years clinical experience) was practicing on an expert level. This was an arbitrary decision made by the researcher in order to divide the anesthesia providers in this study by years of experience as was done in previous studies. The findings of the study indicate that years of experience was not related to choice of agent and, thus, were not entirely consistent with Benner's theory and skill levels.

In Benner's theory, patient care is related to level of provider experience; that is, as experience increases there is improved knowledge of choices available. The number and varieties of surgical procedures attended by providers, agent availability, and physical status of patients given care by providers are more consistent with experience in terms of Benner's theory than years in clinical practice. In Benner's theory, some providers may not progress from one level to the next even with many years of clinical experience. One may not adequately perform the technical or analytical skills required to advance through the levels to reach the expert level.

The researcher believed that if there was a difference in choice of agents by

providers' experience as determined by years of practice, the study results would be consistent with Benner's theory that experience makes a difference in the choice of induction/intubation agent provided to the patient. The findings indicated only a slight difference in choice of agents because of experience (years in practice).

In Benner's theory, advancement in skill levels could occur as experience increases with a greater number and variety of clinical situations. This skill advancement may be gained in a short period in a high volume work place. Years of experience at a low volume and/or less variety of clinical situations in the work place may not provide the same experience and the skill levels of providers may differ accordingly. The assumption that years of practice made a provider more experienced was not consistent with Benner's theory which is not constrained by a chronological timetable.

The analysis of the qualitative and quantitative data in this study indicated that the providers' choice of agents were similar, and that the same reasons were given for the choices regardless of anesthesia provider status (CRNAs and/or anesthesiologists) or years of clinical anesthesia experience. Benner's theory accounts for the qualitative nature of choices based on education, skills acquired, and the number of experiences in a provider's field to determine the skill level of the provider. By choosing the same agents for the same reasons, the providers demonstrated they were functioning on the same skill level. This finding was consistent with Benner's theory and skill levels because providers on the same skill level would be expected to make similar choices.

This study findings indicate that propofol has surpassed thiopental as the intravenous induction agent of choice and that succinylcholine continues to be the most frequently used neuromuscular blocker for intubation by anesthesia providers. This information could be used to educate other anesthesia providers and students of anesthesia as to what practicing providers are using and why they chose the agents they do (actions of agents, education, experience, and cost), possibly influencing the practice of other anesthesia providers.

The findings of the study should be interpreted carefully because of several limitations. The sample subjects were military and the setting was a military institution. The budget and anesthetic agents available to the setting may vary from other military settings and civilian settings. The assumption that equated years of practice with skill levels of anesthesia providers was not borne out and may have altered the data the way the researcher viewed it, at least on initial analysis. The most frequent choice of the induction agent propofol may be related to the increased number of ASA 1 and ASA 2 patients included in this study. Healthier patients are more likely to receive propofol than thiopental because of the direct myocardial depressant effect of propofol. (Table 1.)

This study should be repeated with a focus on the role of costs in determining the agents used in a particular institution. Another avenue for further research would be a comparison of the responses of CRNAs versus anesthesiologists using an anesthesia simulator program in a controlled situation in which the differences in choices could be used to show differences, if any, according to education. The study

could also be conducted utilizing a sample group of anesthesia providers known to be expert (by peer review) and compared to a non-expert group to determine if there are any differences in choices of agents.

The study revealed that anesthesia providers do change their use of agents as newer agents are developed with more advantages to the patient (shorter onset/duration and fewer cardiovascular side effects), and that the providers' experience, education, and cost of the agents were considered in choice of agents.

While conducting the study, the researcher learned about the intravenous agents for induction and intubation, the qualitative nature of choices (why a provider chooses an agent), and that the cost of agents is becoming more of a factor in availability and use. In today's health care settings, an anesthesia provider needs to be able to explain the use of individual agents based on advantages and costs to the patient and the institution.

# APPENDIXES

# Appendix A

# CONSENT FORM FOR CHOICE OF IV INDUCTION AGENT AND INTUBATION NEUROMUSCULAR BLOCKER SURVEY

I am a graduate nurse anesthesia student of the Graduate School of Nursing at the Uniformed Services University of Health Sciences in Bethesda, Maryland. I am conducting a study on the agents that are currently being used for intravenous induction agents for general anesthesia and neuromuscular relaxants for intubation at this hospital. I am requesting your participation in this study as an anesthesia provider. Strict confidentiality will be maintained and in no way will individual provider's responses be identified, except to researcher.

Your participation or non-participation in this study will not adversely affect you. You may discontinue your participation at any point without adverse affect by notifying the researcher. It is my hope that you will decide to participate.

You will be requested to participate in a short interview session. You will be given two case scenarios and asked to discuss your choice of intravenous induction agents and neuromuscular blockers for intubation.

A retrospective review of your anesthesia records over the past year for 10 patients will also be performed to identify the induction agents and intubation blockers used.

By signing this form you are consenting to participate in the study.

date_____Name_____

If you would like to have a summary of the general results of the study please give your name_____ and address _____.

# Appendix B

PROVIDER INTERVIEW SCHEDULE FOR IV INDUCTION AGENT AND INTUBATION NEUROMUSCULAR BLOCKER SURVEY

1. Provider's code_____

2. Gender M or F age____

3. Physicians -Board certified MDA Y or N

4. CRNA or MDA

5. Years of experience as anesthesia provider post anesthesia training

_____

6. The following scenarios are set with each patient to receive intravenous induction for general anesthesia and a neuromuscular blocker for intubation. The patients have no known allergies and no personal/family history of complications with anesthesia.

   a. You have an eighteen year old male presenting for an appendectomy. He has no previous history of medical problems. He has had nothing by mouth for ten hours. He is 5'9" and weighs 72 kgs. He is a smoker. His physical status classification is ASA 2.

   What agent and dose would you use for intravenous induction?

   _____

   How did you determine the choice of agent and dose? Why, factors involved?

   _____

   _____

   _____

What agent/s/dose would you use for neuromuscular blocking for intubation?_____

How did you determine the agent and dose? Why, factors involved?

_____

_____

_____

b. You have a sixty year old female for an elective cholecystectomy. She has no previous history of medical problems. She is 5'5" and weighs 90 kgs. She has had nothing by mouth for eight hours. Her physical status classification is ASA 1.

What agent and dose would you use for intravenous induction?

_____

How did you determine the agent and dose? Why, factors involved?

_____

_____

What agent and dose would you use for neuromuscular blocking for intubation?_____

How did you determine the agent and dose? Why, factors involved?

_____

_____

# Appendix C

Provider code_____

Case #_____

CHART REVIEW FORM FOR CHOICE OF IV INDUCTION AGENT AND INTUBATION NEUROMUSCULAR BLOCKER SURVEY

Demographics

1. Hospital number_____
2. Age (16-75) years _____
3. Weight (kgs) _____
4. Gender M (1) or F (2)

Status

5. ASA # 1 2 3
6. full stomach yes (1) or no (2)
7. Surgical Procedure _____

Drugs

8. IV agent and dose used for induction of general anesthesia._____
9. IV agent and dose used for neuromuscular blocking for intubation._____

# Appendix D

Table 5. Reasons to use thiopental by least experienced anesthesia providers identified in interviews using scenario #1.

CHEAP
READILY AVAILABLE
RELIABLE LOW INCIDENCE OF PAIN UPON INJECTION
PRODUCES RAPID HYPNOSIS/UNCONSCIOUSNESS
DOES NOT NEED REFRIGERATED
PRESCRIBED FOR RAPID SEQUENCE INDUCTION
COMFORTABLE WITH THIOPENTAL OR PROPOFOL
CHEAPER THAN OTHERS
ACUTE ABDOMEN
USED FOR RAPID SEQUENCE INDUCTION
EDUCATION
EXPERIENCE
IF HEMODYNAMICALLY STABLE NO REASON TO USE ANYTHING ELSE
ACUTE ABDOMEN
CHEAPER THAN PROPOFOL
ONLY NEED ONE TIME DOSE
LASTS LONGER THAN PROPOFOL
AIDES ON DECREASING NEED FOR ISOFLORANE
RAPID ONSET
MOST THERAPEUTIC DOSE FOR SIZE/AGE OF PATIENT

Reasons to use thiopental by most experienced anesthesia providers identified in interview using scenario #1.

AIDES ON DECREASING ISOFLORANE NEED
LAST LONGER THAN PROPOFOL

Table 6. Reasons to use thiopental by least experienced anesthesia providers identified in interviews using scenario #2.

| |
|---|
| CHEAP |
| READILY AVAILABLE |
| RELIABLE LOW INCIDENCE PAIN UPON INJECTION |
| PRODUCES RAPID HYPNOSIS/UNCONSCIOUSNESS |
| AGE OF PATIENT |
| INEXPENSIVE |
| CONVENIENT |
| EXPERIENCE |
| SATISFACTORY RESULTS |
| WHEN HEMODYNAMICALLY STABLE , HEALTHY |
| CHEAPEST |
| LEASE DECREASE IN BLOOD PRESSURE |
| MOST RELIABLE DRUG WE HAVE |

TABLE 7. Reasons to use propofol by least experienced anesthesia providers identified in interviews using scenario #1.

CONVENIENCE
AVAILABILITY
SHORT DURATION OF CASE EXPECTED
CAN GIVE REQUIRED MINIMAL AMOUNT
DECREASED POST-OPERATIVE NAUSEA
SHORT RECOVERY
HEALTHY, YOUNG SMOKER
PERSONAL PREFERENCE
ANTIEMETIC EFFECT
RAPID SEQUENCE INDUCTION
EXPERIENCE WITH PROPOFOL
SHORTER DURATION THAN THIOPENTAL
ANTIEMETIC PROPERTIES
RAPIDLY DISTRIBUTED AND ELIMINATED
HEALTHY PATIENT

Reasons to use propofol by most experienced anesthesia providers identified in interviews using scenario #1.

YOUNG
HEALTHY
STABLE HEMODYNAMICALLY
SHORT CASE EXPECTED
PERSONAL CHOICE
RAPID ONSET NEEDED BY EXPERIENCE WITH TEEN INDUCTION (VIOLENCE)

Table 8. Reasons to use propofol by least experienced anesthesia providers identified in interviews using scenario #2.

NO PARTICULAR REASON TO CHOOSE OVER THIOPENTAL
MODIFIED RAPID SEQUENCE INDUCTION
IF MALLAMPATI 1
RAPID SEQUENCE INDUCTION NOT INDICATED
PERSONAL PREFERENCE
RAPID SEQUENCE INDUCTION
EXPERIENCE
ANTIEMETIC
ANTIEMETIC EFFECT
SHORTER ACTING AGENT

Reasons to use propofol by most experienced anesthesia providers identified in interviews using scenario #2.

PATIENT ESSENTIALLY HEALTHY
NO SUSPECTED HEMODYNAMIC INSTABILITY
RAPID ON AND OFF
I DON'T USE THIOPENTAL UNLESS PLAN TO BE ASLEEP FOR A LONG TIME
EXPERIENCE
EDUCATION

TABLE 9. Reasons to use succinylcholine by least experienced anesthesia providers identified in interviews using scenario #1.

CHEAP
READILY AVAILABLE
SMALL INCIDENCE ADVERSE EFFECTS
RAPID SEQUENCE INDUCTION
INEXPENSIVE
EXPERIENCE
UNNECESSARY TO USE NONDEPOLARIZER
FULL STOMACH TREATMENT (RAPID SEQUENCE INDUCTION)
ONLY AGENT FOR RAPID SEQUENCE INDUCTION IN ADULT RELATED TO ACUTE ABDOMEN
RAPID INTUBATION CONDITIONS
TAUGHT TO USE FOR RAPID SEQUENCE INDUCTION
RAPID ONSET
QUICKER ONSET FOR RAPID SEQUENCE AND SECURING AIRWAY
EDUCATION

Reasons to use succinylcholine by most experienced anesthesia providers identified in interviews using scenario #1.

RAPID SEQUENCE INDUCTION
EXPERIENCE THAT IT WORKS FASTER AND SHORTER THAN ANY OTHER DRUG AVAILABLE
USE FOR RAPID SEQUENCE INDUCTION
AGENT OF CHOICE FOR RAPID SEQUENCE INDUCTION
TREAT AS FULL STOMACH (RAPID SEQUENCE INDUCTION)

Table 10. Reasons to use succinylcholine by least experienced anesthesia providers identified in interviews using scenario #2.

EXPERIENCE
TAUGHT TO USE FOR RAPID SEQUENCE INDUCTION
CHEAP
READILY AVAILABLE
SMALL INCIDENCE ADVERSE EFFECTS
RAPID SEQUENCE INDUCTION
RAPID SECURING AIRWAY NEEDED RELATED TO OBESITY
NEED TO PRACTICE MORE SAFELY AS IN TREATING THIS PT WITH RAPID SEQUENCE INDUCTION RELATED TO OBESITY, THAN TAKE A CHANCE FOR ROUTINE INTUBATION AND HAVE HER ASPIRATE
TRAINING
BOOKS RECOMMEND

Table 11. Reasons to use zemuron by least experienced anesthesia providers identified in interviews using scenario #2.

STANDARD DOSE WILL LAST 50 MINS TO ONE HOUR
ADEQUATE MUSCLE RELAXATION
USUALLY ADEQUATE TIME
CHEAPER
USE NONDEPOLARIZER WHEN NO REASON TO GIVE SUCCINYLCHOLINE
MIVACRON TOO EXPENSIVE
ATRACURIUM BAD INTUBATING CONDITIONS
ZEMURON BEST, FASTEST INTUBATING CONDITIONS
AVOID SUCCINYLCHOLINE IN NORMAL AIRWAY RELATED TO POST-OPERATIVE MYALGIAS
ZEMURON IS MOST RAPID AND CHEAP NONDEPOLARIZER
MOST RAPID NONDEPOLARIZING MUSCLE BLOCKER TO DECREASE POTENTIAL ASPIRATION
DON'T HAVE TO REPEAT AS OFTEN AS OTHERS

TABLE 12. Reasons to use norcuron (vecuronium) by least experienced providers identified in interviews using scenario #1.

NO HISTAMINE RELEASE RELATED TO AIRWAY AS A SMOKER

Table 13. Reasons to use norcuron (vecuronium) by least experienced providers in scenario #2.

DOESN'T NEED SUCCINYLCHOLINE
AVOID POSSIBLE TRISMUS,
MALIGNANT HYPERTHERMIA
NORCURON OVER ZEMURON OVER TIME R/T SHORTER DURATION FOR NORCURON
CARDIOVASCULAR STABILITY
HANGS AROUND WHILE
DON'T HAVE TO WORRY ABOUT REDOSING
AS LONG AS GOOD A/W
PERSONAL PREFERENCE
EXPERIENCE

Reasons to use norcuron (vecuronium) by most experienced providers in scenario #2.

BENIGN IN ORGAN SYSTEMS
SAFEST DRUG TO USE

Table 14. Reasons to use atracurium by least experienced providers in scenario #2.

CAN CONTINUE TO GIVE PROPOFOL AND ATRACURIUM IF NEEDED,
MORE STABLE THAN STP
PERSONAL CHOICE

TABLE 15. Reasons to use mivacron by most experienced providers in scenario #1.

PERSONAL PREFERENCE
RAPID
GOES AWAY QUICKLY

Table 16. Reasons to use mivacron by most experienced providers in scenario #2.

PERSONAL CHOICE

Table 17. Agents not used by least experienced providers in scenario #1.

ZEMURON
ATRACURIUM
MIVACRON

Agents not used by most experienced providers in scenario #1.

ZEMURON
NORCURON
ATRACURIUM

Agents not used by least experienced providers in scenario #2.

MIVACRON

Agents not used by most experienced providers in scenario #2.

THIOPENTAL
SUCCINYLCHOLINE
ZEMURON
ATRACURIUM

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